Antibiotic consumption to early detect epidemics of *P. aeruginosa* in a burn center: a paradigm shift in the epidemiological surveillance of *P. aeruginosa* nosocomial infections

Anne Fournier[1,5], Philippe Eggimann[2], Olivier Pantet[2], Marie Krähenbühl[3], Claire-Lise Bonnemain[3], Camille Fournier[3], Jean-Luc Pagani[2], Jean-Pierre Revelly[2], Elise Dupuis-Lozeron[4], Farshid Sadeghipour[1,5], André Pannatier[1], Pierre Voirol[1,5], Yok-Ai Que[2]

[1]Pharmacy, [2]Critical Care, [3]Faculty of Biology and Medicine, CHUV, Lausanne; [4]Research Center for Statistics, University of Geneva, Geneva, Switzerland; [5] School of Pharmaceutical Sciences, University of Geneva, University of Lausanne, Geneva, Switzerland.

Introduction

The control of antibiotic resistance and nosocomial infections are major challenges for specialized burn centers[1]. Early detection of those epidemic outbreaks is crucial to limit the human and financial burden.

Objectives

We hypothesize that data collected by antibiotic consumption medico-economic surveys[2] could be used as warning signal to detect early nosocomial outbreaks.

Reports from the trimestrial interdisciplinary drug monitoring

2005

Lausanne Burn Intensive Care Unit (BICU)

Conclusion

Our data support a **paradigm shift** in the **epidemiological surveillance** of **nosocomial *P. aeruginosa* epide-mics** in **burn centers**, using the rise in antibiotic consumption as an early trigger to initiate the molecular typing of *P. aeruginosa* strains and the reinforcement of standard infection control procedures.

Methods

A retrospective analysis was conducted including all burn patients staying >48 h on the Lausanne BICU between **January 2001** and **October 2012** who received systemic therapeutic antibiotics. Infection episodes were characterized according to predefined criteria[3-5]. Based on the retrospective typing of the strains[6], we defined a *P. aeruginosa* epidemic above the threshold of 25 infections/1000 burn-days (BD). Antibiotic consumption data, obtained from the quarterly surveillance of drug consumption surveys, were translated into defined daily doses (DDDs).

Figure 1: Number of infections according to isolated microorganisms over the study period.

Results

In total, **297** out of 414 burn patients stayed **>48h**, giving a total of 7458 BD. We identified **610 infection episodes** in **189 patients** (63.6%). **Burn wounds** (32.0%), **pulmonary** (31.1%) and **catheter infections** (21.8%) were the most prevalent types of infections. The most frequently isolated microorganisms were ***P. aeruginosa*** (26.2%), *S. aureus* (13.4%) and *C. albicans* (7.0%) (**Fig. 1**). We observed 3 distinct outbreaks of *P. aeruginosa* infections (2002-2003, 2006 and 2009-2011). These outbreaks correlated with an increase in the DDDs of anti-*Pseudomonas* antibiotics (Spearman's rho=0.59, p=0.044) (**Fig. 2**).
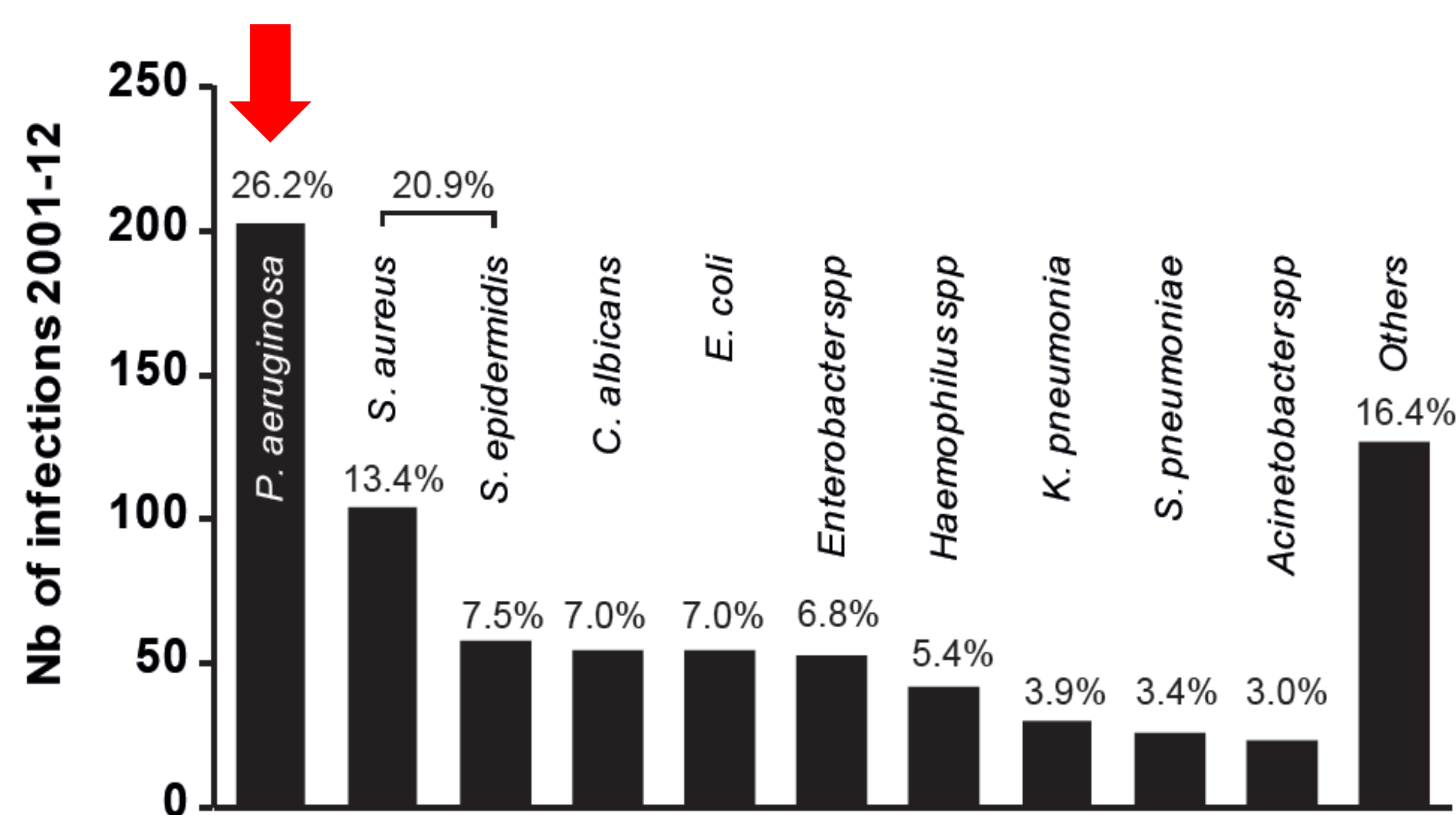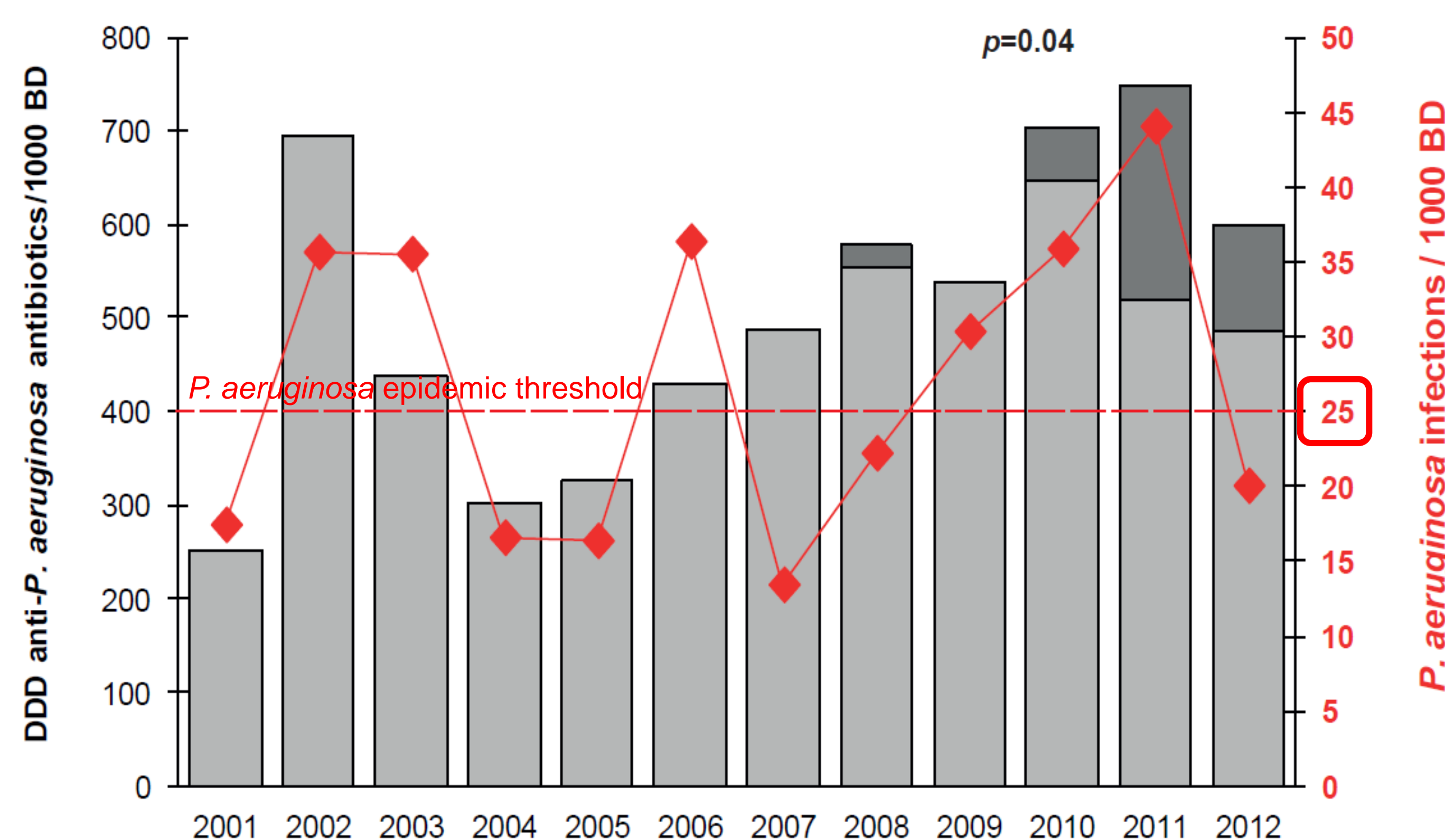

Figure 2: Number of *P. aeruginosa* infections per 1000 burn-days (right axis, in red) and DDDs of the most frequently used anti-*P. aeruginosa* antibiotics (left axis, cefepime, ciprofloxacin, ceftazidime, imipenem-cilastatin, meropenem, piperacillin-tazobactam in light grey bars; colistin in dark grey bars).

References

1. Bloemsma et al. Mortality and causes of death in a burn centre. Burns : journal of the International Society for Burn Injuries. 2008;34(8):1103-7.
2. Carron et al. Five-year evolution of drug prescribing in a university adult intensive care unit. Applied health economics and health policy. 2012;10(5):355-8.
3. Levy et al. 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference. Intensive care medicine. 2003;29:530-8.
4. Greenhalgh et al. American Burn Association consensus conference to define sepsis and infection in burns. Journal of burn care & research. 2007;28:776-90.
5. Calandra et al. International Sepsis Forum Definition of Infection in the ICUCC. Critical care medicine. 2005;33:1538-48.
6. Cutteld et al. Molecular epidemiology of Pseudomonas aeruginosa in intensive care units over a 10-year period (1998-2007); 2011;17:57-62.

GSASA

Zürich 2015